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ABSTRACT

Many physiological and psychological processes fluctuate throughout the day in fairly stable, rhythmic patterns. The relationship between individual differences in circadian activity rhythms and a sense of time urgency were explored as well as a number of achievement-related variables. Undergraduates (N=308), whose circadian activity rhythms were assessed via Horne and Ostberg's Morningness-Eveningness Questionnaire, completed measures of achievement motivation, task orientation, and time urgency. Results indicated that "morning types" completed the questionnaires more quickly than others, expressed negative attitudes toward wasting time, and scored higher on measures of achievement tendency, task leadership, ambition, and introversion. Significant sex differences appeared on many of the morningness-eveningness correlates, i.e., males were more achievement-oriented, placed more value on being a leader, and were more adverse to wasting time: however, men and women did not differ on Morningness or Eveningness. Evidence suggests that individual differences in circadian activity rhythms are more than a component of task orientation, and that being a "morning type" in an achievement-oriented culture facilitates the development of achievement and time concerns. (Author/NRB)

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Circadian Activity Rhythms, Time Urgency, and Achievement Concerns

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Circadian Activity Rhythms, Time Urgency, and Achievement Concerns

The purpose of this research was to explore the relationship between individual differences in circadian activity rhythms (i. e., differences in the time of day the individual feels and performs best) and a sense of time urgency (i. e., believing that time is a valuable, expendable resource that should not be wasted) as well as a number of achievement-related variables. Time schedules, punctuality, and a quick pace tend to be highly valued in the achievement-oriented American culture (Friedman, 1969; Levine, West, & Reis, 1980), and early morning activity is connected normatively and functionally to achievement success in most contexts in this culture (cf. Melbin, 1978). Some people, however, are more alert and ready to perform during morning hours than are others. Because some people's circadian activity rhythms are more compatible with achievement concerns than are others', it was predicted that achievement concerns and time urgency would be related to morning-active circadian rhythms.

Scientists have recognized for a number of years that many physiological and psychological processes fluctuate throughout the day in fairly stable, rhythmic patterns (e. g., Freeman & Hovland, 1934; Kleitman, 1939). Patterns of activity through a 24-hour period are related to rhythms of body temperature, alertness, subjective feelings of well-being, and performance on a number of tasks. In general, the circadian curves of speed and accuracy on tasks, body temperature, and feelings of alertness, arousal, and energy reach a maximum in the afternoon and are lowest very early in the morning (Kleitman, 1963; Luce, 1971). These curves are not simply a function of the sleep-wake cycle; Fröberg (1977) has found that the cycles are

maintained in subjects who are deprived of sleep for 72 hours.

There are individual differences in the components of circadian activity rhythms, and although there are problems with empirical definitions of morningness-eveningness (Horne & Östberg, 1977; Wendt, 1977), both common wisdom and scientific research generally recognize morning types ("early birds") and evening types ("night owls"). Some people arise early, feeling alert and refreshed, ready to start the day's activities, whereas others arise later, and their feelings of alertness and well-being are slower to rise to their daily peak (Fröberg, 1977; Horne & Östberg, 1976). Morning types differ from evening types in more than the times that define their sleep-wake cycle; evening types take longer to wake fully and become alert.

Horne and Östberg (1976) divided subjects into three groups according to their responses to paper-and-pencil items designed to assess their morningness-eveningness. For example, they asked subjects how alert they felt one half-hour after waking, how their sleep cycle would be affected by various activities, and what time of day they would choose to perform certain activities so that they would be at their "'feeling best' peak." Subjects took their oral temperature every waking half-hour for three weeks. Self-assess Morning types had a peak temperature significantly earlier than Evening types, and Intermediates' temperature peak was significantly different from the temperature peaks of Morning and Evening types. Evening types went to bed (M = 1:05 AM) significantly later than Intermediate (M = 11:30 PM) and Morning types (M = 11:26 PM) and arose later (M = 9:18 AM) than Intermediates (M = 8:07 AM) or Morning subjects (M = 7:24 AM). Bedtime, arising, and peak temperature time were all significantly correlated

with self-assessed morningness-eveningness; only amount of sleep was not significantly related to individual differences in circadian activity rhythm.

In this culture, early arising is normatively connected to achievement: The early bird catches the worm; Early to bed and early to rise makes a man healthy, wealthy, and wise. Objectively it seems obvious that a person who arises at 10:00 AM and goes to bed at 2:00 AM has the potential to accomplish as much as a person who arises at 6:00 AM and retires at 10:00 PM. Subjectively, however, sleeping late may seem to be related to "wasting" time, an anathema to those who believe that time is a valuable resource, something that is fleeting and unrecoverable.

In some cultures -- like this one -- people think of time as a linear process, a succession of unvarying units with the past reflected in a series of historic events. In other cultures, however, time is thought of as a cyclical process of rhythmic recurrences. For example, we tend to think of each day as a unique event; in contrast, the Hopi Indians, who think of time as cyclical, believe that the rising sun marks the return of yesterday in a slightly different form, not the beginning of a new day (Maxwell, 1972).

It was the emphasis on a monetary economy, which was introduced during the western world's Industrial Revolution, combined with a linear concept of time, which led to the belief that time is a resource dissociated with human and social events (Whitrow, 1970). While power was based on land ownership and astrologers were influential scholars, the cyclical aspects of the seasons and the universe were primary. By the 1800s, however, in western industrialized countries the mass production of inexpensive watches

and the notion that time is money gave rise to living by time, not biological and environmental rhythms. People began to eat by time, not hunger; they began to sleep by time and wake by time, not sleepiness; they began to work by time, not work to be done. Lives began to be ruled by the clock.

> ...loafing is wasted time, and time shouldn't be wasted. It is valuable and scarce. One has only twenty-four hours of it a day. The scarcity of time may appear puzzling. One has always had twenty-four hours of it. They should not seem less now than before. Before, however, one did not have twenty-four hours. There was a sunrise and a sunset, a noon or a hottest part, and there was night. Above all, one had a day, a day of a certain character according to the calendar. Then that great space was partitioned into 1,440 tiny cubicles....A day of twenty-four hours or 1,440 minutes divided into five- or ten- or twenty-minute groups survives in popular custom only if the divisions prove useful....All appointments must be kept by continual reference to the inexorable clock. If you miss a bus or train, or only fail to make a stoplight when on schedule, the result is fear and nervousness at being late, or the tension of not getting done all that you were supposed to. The cramming of hours and minutes takes place because of the belief that time's units are interchangeable and commercially valuable, but it is the clock itself that permits the constant checking and adjusting of one's actions....Other commercial societies have had the feeling of urgency and many things to do, similar to ours, but ours can be more tightly scheduled and made almost escape proof by the ubiquitous clock and the machines geared to it.... No other nation by now is as precise in its time sense or so time-conscious as the United States. Americans generally are aware that time runs by steadily and is being used up evenly, minute after minute, hour after hour, day after day — inexorable, impersonal, universal time. In countries without dependence on the clock, there is largely the sense of passage of biological time....We have almost lost this rhythmical sense of time (de Grazia, 1972, pp 456-458).

Some people's circadian activity rhythms are more compatible with this social rhythm defined by clock time than are others'. That is, some people are physiologically and psychologically early morning types in this morning-active environment. Schools, and most jobs, demand productivity in the morning hours. It is possible that task-oriented

people, in efforts to be most efficient and productive, become morning-active. Circadian activity rhythms are influenced by external factors — time of day, position of the sun, others' activity cycles — and can be "reset" to begin earlier or later in the day (Rockwell, Hodgson, Beljan, & Winget, 1976; Weston, 1979). Yet there is evidence from studies of jet lag and "free running" (living in an environment with no external time cues and no schedules of any type) that disruptions of circadian activity rhythms are psychologically and physiologically stressful and that it is easier to set these rhythms to a natural state than it is to modify them away from their natural rhythm. In fact, people who have had the opportunity to "free run" have reported the experience to be a very pleasurable one, particularly when their daily temperature cycle follows the same curve as their activity rhythm (Weston, 1979). Therefore, it is also possible that being a morning type aids in the development of an achievement orientation and a sense of time urgency because under such conditions personal and social rhythms tend to be synchronized. This perspective, of course, does not negate the possibility of evening types developing an achievement orientation, although one would expect that achievement-oriented evening types would have a tendency to seek employment in areas that do not often require early morning work schedules, such as academics or entertainment.

In this research, it was predicted that a moderate, positive relationship between morningness and achievement orientation and a sense of time urgency would be found. Dawson (1970) found that "early birds" (those who preferred morning activities rather than evening activities) were more apt to complete more entries in an annotated bibliography written for course

credit than were "night owls." According to McClelland (1961), people with low achievement motivation are not as concerned with the passage of time as people with high achievement motivation. Meade (1966) found that American college students who scored high in achievement motivation experienced time as shorter when they were making progress toward a goal and longer when not making progress; subjects low in achievement motivation were not affected in their time estimates by their progress on tasks. This evidence — scanty, at best — does tenuously support the hypothesis of a relationship between morningness, valuing of task achievement, and an aversion to wasting time.

Subjects in this study completed a morningness-eveningness scale, several pencil-and-paper measures of concern with task achievement, and attitudes toward time and money items. Behavioral data relevant to a sense of time urgency (punctuality and pace) were collected. Some of the participants also completed a measure of the Type A behavior pattern and an introversion-extraversion scale in a second part of the research.

Method

Subjects

Introductory psychology students from Michigan State University were recruited to participate in this research for course credit. A total of 308 students, 92 males and 216 females, completed usable questionnaires.

Instruments

Circadian activity rhythms were assessed via Horne and Östberg's (1976) Morningness-Eveningness Questionnaire. This measure is a modification of a Swedish-language questionnaire that the authors had adapted for use

in Great Britain. The 19 multiple-choice items deal with time-of-day peaks in performance, alertness, sleep patterns, and other activities, and were validated using body temperature and sleep-wake cycle information obtained from the original respondents.

Mehrabian's (1969) Achieving Tendency Scale for Males was administered. In a review of the measures of achievement motivation, Fineman (1977) concluded that only Mehrabian's scale is internally consistent, stable, valid, controls for deliberate distortion of responses, is quick and easy to complete, and is self-administered.

Other components of task orientation, namely valuing of task leadership, task competence, and acceptance of traditional task goals, were assessed by having subjects complete a survey of interpersonal values (see Watts, Messé, & Vallacher, in press).

In addition, items designed to assess a sense of time urgency were included to determine if, as predicted, the belief that time is a valuable, spendable resource ("time is money") is a significant correlate of morningness. These items included "I go out of my way to avoid standing in line" and "I hate to waste time." Items designed to tap respondents' attitudes toward making and spending money were also included. Respondents indicated the extent of their agreement with these time and money statements on 5-point scales.

Behavioral measures of time urgency were included. Respondents indicated the time that they began the questionnaires and the time they finished, which permitted assessment of how early or late the subjects were for the scheduled research session and how long it took each to complete all of the items.

A total of 22 subjects also completed the 14-item Bortner (1969) Pattern A Self-Rating Scale, which was modified for this study by presenting the items with a 5-point response scale ranging from "extremely like me" to "not like me' rather than a nonsegmented 1 ½ inch line. This subsample also completed Eysenck's (1973) EPI Form A scale, a measure of introversion-extraversion which normally contains a Lie Scale (a social desirablity measure) and a Neuroticism Scale. The latter scale's items were not included in this research.

Procedure

The questionnaire booklet containing the Morningness-Eveningness Questionnaire, the Achieving Tendency Scale for Males, the survey of interpersonal values, and the time and money attitude items was administered in large, mixed-sex groups during the middle to late afternoon during the middle week of Fall Quarter, 1980. It was stressed when the introductory psychology students were given the opportunity to volunteer that the study would be conducted only during the specified week. The limited opportunity to participate was emphasized to minimize procrastinators' tendencies to put off participation to a later date, which would have been a liability if morning types not only do things earlier in the day but also earlier in the term than evening types.

Male and female researchers arrived 15 minutes prior to the scheduled starting time for each session and distributed questionnaires to those who had already arrived and as participants arrived. All instructions were presented in written form, so respondents could begin immediately and work at a self-determined pace. The first thing and the last thing subjects were asked to do was write down the time as indicated by the wall

clock in the room.

Approximately three weeks after their participation, respondents were recruited to complete the Type A scale and the introversion-extraversion scale for additional course credit. Twenty-two of the original subjects responded and completed usable questionnaires.

Results

Morningness-Eveningness and Its Correlates

Responses to the 19 Morningness-Eveningness items were factor analyzed with varimax rotation for eigenvalues greater than 1.0. Two factors emerged. Eleven items, all of which dealt with time of arising and early morning activities, loaded on the first factor. These 11 items were combined to form the Morningness subscale, which had a coefficient alpha equal to .80.[1] The remaining eight items generally referred to evening activities and bedtime; they loaded on the second factor. Coefficient alpha for the Eveningness subscale equalled .61.

Interscale correlations for Morningness, Eveningness, Achieving Tendency, Task Leadership Values, Task Competence Values, Task Independence Values (not accepting normative work goals), Time Attitudes, and Money Attitudes are presented in Table 1. Moderate, positive correlations were found between describing oneself as a morning person and achievement tendency, valuing of task leadership, and having negative attitudes toward wasting time. A moderate, positive relationship between describing oneself as an evening person and having a favorable attitude toward making and spending large amounts of money were also found. Morningness and Eveningness were negatively correlated.

To test the hypothesis that concern with time, money, achievement,

Table 1

Morningness and Eveningness

and Scale Intercorrelations

	EVEN	ACHIEVE	LEAD	COMP	INDEP	TIME	MONEY
Morningness	-.33 N=300 p<.01	.27 N=300 p<.01	.19 N=256 p<.01	-.01 N=256 p>.40	-.09 N=259 p<.10	.26 N=301 p<.01	-.13 N=299 p<.01
Eveningness (EVEN)		-.02 N=302 p>.30	-.01 N=258 p>.30	-.03 N=258 p>.30	.05 N=261 p>.10	-.08 N=303 p<.10	.24 N=301 p<.01
Achievement Tendency (ACHIEVE)			.12 N=260 p<.05	.13 N=260 p<.02	.20 N=263 p<.01	.03 N=303 p>.10	-.17 N=302 p<.01
Task Leadership Values (LEAD)				-.10 N=254 p<.10	-.16 N=255 p<.01	.20 N=260 p<.01	.22 N=259 p<.01
Task Competence Values (COMP)					.21 N=254 p<.01	.07 N=260 p>.10	.04 N=259 p>.20
Task Independence Values (INDEP)						.009 N=263 p>.40	.002 N=262 p>.40
Aversion to Wasting Time (TIME)							.28 N=304 p<.01
Desire to Earn and Spend Money (MONEY)							

task leadership, and traditional work goals are all important and distinct components of circadian activity rhythms, stepwise multiple regression analyses were performed on these variables to predict Morningness and Eveningness. Regression analyses were computed separately for males and females, but because these results were similar, only the combined regression information is presented here.[2]

The multiple R for Morningness was highly significant, F (5, 236) = 11.36, $p < .001$, $R^2 = .19$. Stepwise Fs for each of the predictors were significant. (See Table 2.) Achievement tendency, attitudes toward time and money, traditional work goals, and task leadership values all predicted Morningness scores.

The multiple R for Eveningness was significant also, F (5, 236) = 4.59, $p < .001$, $R^2 = .09$. Inspection of the stepwise Fs presented in Table 2 reveals that attitudes toward time and money significantly predicted Eveningness scores.

To determine if individual differences in circadian activity rhythms significantly predicted time-urgent behavior, separate multiple regression analyses were performed to examine Morningness, Eveningness, time and money attitudes, and task independence scores as predictors of arrival time at the experimental session (how early or late the respondent arrived) and of the amount of time taken to complete the questionnaire booklet. Although the overall Fs were not significant, Morningness significantly predicted the amount of time taken to complete the questionnaire, F (1,240) = 3.97, $p < .05$. The earlier the circadian activity rhythm began and peaked, the faster the completion time ($r = .11$, $p < .05$).[3] None of the other predictors was significantly related to either criterion.

Table 2

Stepwise Fs for Predicting Morningness and Eveningness

Morningness

Predictor	F	p
Achievement Tendency	13.97	<.001
Aversion to Wasting Time	18.59	<.001
Desire to Earn and Spend Money	7.81	.006
Task Independence Values	3.94	.048
Task Leadership Values	4.96	.027

Eveningness

Predictor	F	p
Achievement Tendency	0.0	.936
Aversion to Wasting Time	5.17	.024
Desire to Earn and Spend Money	19.40	<.001
Task Independence Values	.18	.668
Task Leadership Values	1.06	.302

To examine the relationship between time urgency as a component of the Type A behavior pattern and morningness-eveningness, the responses of the subsample to the seven items of the Pattern A Self Rating Scale that deal with time-urgent behavior were summed and correlated with Morningness and Eveningness scores. Although there were no significant relationships between this time urgency scale and either Morningness or Eveningness, some of the individual items were significantly correlated with Morningness. Morning active people did not describe themselves as doing things like talking or eating faster than others, but they did tend to say they never take things one at at time (r = .63, $p < .001$) and tend to go "all out" (r = .34, $p < .10$).

The remaining six items of the Pattern A Self Rating Scale tap hard-driving ambition. The sum of these ambition scores was strongly related to Morningness, r = .51, $p < .01$.

Morningness was found to be significantly related to introversion, r = .45, $p < .02$, and Eveningness was significantly related to extraversion (i. e., was negatively related to introversion), r = .47, $p < .02$. However, morningness scores were found to be negatively correlated with responses to "Are you slow and unhurried in the way you move?" (an item Eysenck designed to be answered positively by introverts), r = -.37, $p < .05$. Morning types were also more apt to say they like things in which they have to act quickly, although this correlation did not reach significance, r = .14, $p < .20$. These results give further weight to the proposition that early morningness is positively related to an aversion to wasting time and a valuing of a quick pace.

Sex Differences

Males and females differed significantly in their responses to the achieving tendency scale, the measure of task leadership values, and the time attitude items. Males were more achievement oriented (t (303) = 2.65, $p<.01$), valued being a leader more highly (t (259) = 4.38, $p<.001$), and were more averse to wasting time (t (304) = 5.19, $p<.001$). Males also were marginally more interested in making and spending money than were females (t (302) = 1.83, $p<.07$). There were, however, no sex differences in Morningness or in Eveningness.

Discussion

The preponderance of the evidence that this research yielded suggests that people who wake early, alert and refreshed, are task-oriented, hard-driving people who prefer to lead rather than follow and who avoid wasting time by doing things fairly quickly and by trying to do more than one thing at a time. These morning-active types seem to have literally and figuratively more "get up and go" than others have.

Although correlational, the pattern of results from this study provide some information about the possible direction of causality in the relationship between circadian activity rhythm and time urgency and achievement. Intuitively, it seems quite likely that time and achievement concerns might lead to morningness — subjectively, getting up and starting work early in the day seem to waste the least amount of time; actually, in many work environments, morning activity may be the most productive. Conversely, however, being morning-active in a culture in which achievement is connected to morning activity, starting with the earliest years of schooling and often

continuing through a lifetime of 8-to-5 work, may aid the internalization of that culture's time and achievement norms.

This study provides evidence that this latter interpretation is a tenable one. If circadian activity rhythm is simply a component of a more general task orientation, one would expect that males — who had significantly higher scores on the task-oriented and time-concern predictors of Morningness — would differ from females in their Morningness scores. Such, however, was not the case; there was no sex difference in responses the items that assessed circadian activity rhythms. Therefore, it is reasonable to speculate that although there may be some adjustment to morning-active circadian rhythms in those who hate to waste time and want to get tasks done (and done quickly), there also may be a facilitation effect of morningness that leads to greater achievement strivings and a sense of time urgency in this culture.

People who wake up slowly and reach their "feeling best" peak comparitively late in the day have activity rhythms that are not well synchronized with those of the prevailing culture. This lack of synchronization may create a sense of incompatibility with time and achievement norms. Other factors, of course, might well encourage the development of an achievement orientation in people who are not morning types, but the suggestion here is that this development is hindered to some extent by the lack of synchronization. Somewhat similarly, females' development of achievement and time-urgent orientations may be hampered by the norms for their sex, which differ from those of the general culture (Broverman, Vogel, Broverman, Clarkson, & Rosenkrantz, 1972; Deaux, 1976), but this does not imply that women do not develop achievement

concerns, only that sex role norms facilitate the development of an achievement orientation in males and hinder its development in females.

Except for their sex role, females have the same potential to become as achievement oriented as males. Except for their circadian activity rhythm, evening types have the same potential to become as achievement oriented as morning types. This study found sex differences in achievement and time concerns, but no sex difference in circadian activity rhythms; yet, there were circadian rhythm differences in achievement and time concerns. It is appropriate to conclude that morningness-eveningness is an important dimension in understanding individual differences in time urgency and task concerns, and that morningness promotes their development.

Further research obviously is indicated. Our culture emphasizes clock time and all but ignores biological circadian rhythms. There are fewer achievement-related opportunities for evening people than there are for morning people; schools are based on morning activity. This study tentatively suggests the effects this may have on people who are not morning active, but this is only a first step. The direction of causality needs to be confirmed, and possible stress effects of unsynchronized biological, psychological, and social circadian activity rhythms need to be studied. Negative effects of time urgency and achievement strivings are being recognized, particularly in research on the Type A behavior pattern (e. g., Friedman, 1969; Glass, 1977), and thus it is important to understand the interactive effects of personal dispositions and social norms to achieve both to encourage the maximization of individuals' potential and to minimize the possible debilitating effects of being hard-driving, task-oriented, and time-urgent.

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Footnotes

[1]Subsequent research has revealed that the test-retest correlation for Morningness over three months equals .88.

[2]Males' achieving tendency and time attitudes significantly predicted their Morningness scores; their leadership scores were a marginal predictor. Females' achieving tendency and time and money attitudes were significant predictors.

[3]Even with time attitudes and achieving tendency taken into account, the correlation between Morningness and completion pace remained, $r = .09$, $p < .06$.